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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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P A T E N T & T R A D E M A R K S
S E R V I C E
JCT 10
In re pending Patent Application of: : Serial No. 09/665,642
George A. Smith et al. :
Filing Date 09/19/2000 : Group Art Unit: 1751
For: "Alkyl Toluene Sulfonate Detergents" : Examiner: Ogden, Jr.; Necholus
: :
: :

Certificate of Mailing

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Martha Victory
Signature

8-10-04
Date

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

APPELLANT'S BRIEF UNDER 37 CFR § 1.192

Dear Sir,

Pursuant to 37 C.F.R. § 1.192, Your Appellants submit herewith this Appeal Brief, in triplicate.

The Commissioner is hereby authorized to charge the required fee for this Brief to Deposit Account 08-3442.

Real Party in Interest

The entire interest in the present Application is owned by Huntsman Petrochemical Corporation, a privately-held corporation organized and existing under the laws of the State of Delaware.

Related Appeals and Interferences

There are two pending patent applications for which Appellant is filing separate Appeals, each of which claim subject matter similar to that in the instant case, and each of which are rejected on substantially the same grounds as the instant case. The identities of the other two applications are: 10/370,144 filed 02/19/2003; and 10/263,547 filed 10/03/2002.

Status of Claims

The status of the claims as of the date of filing this Brief are that claims 1-101 stand as allegedly rejected under 35 USC 103(a) over Feierstein et al. (US Patent 4,162,236).

Status of Amendments

There were no amendments filed in this case.

Summary of Invention

The present invention is directed to methods and catalysts for production of alkylaromatic sulfonate detergents and their precursors, in which the catalyst used in the alkylation has high substrate olefin conversion, and high selectivity to 2-phenyl isomer alkylaromatic production. Through use of this aspect of the invention, 2-phenyl alkylaromatics may be produced in yields in excess of 80.0 % on the basis of catalyst selectivity. The invention also provides detergent compositions and cleaning formulations made with a component that comprises a mixture of sulfonated alkylaromatics (benzene , toluene, or ethylbenzene) in which the hydrocarbon groups that are bonded to the ring of the alkylaromatic may comprise any number of carbon atoms in the detergent range and in which at least

80% (weight basis) of the sulfonated alkylbenzene isomers present have the aromatic group attached to the hydrocarbon group in the 2 position of the hydrocarbon chain.

Issues

Issue 1 - Whether claims 1 – 101 are patentable over the Feierstein et al. reference (US 4,162,236).

Grouping of Claims

Appellants respectfully request that all grounds of this appeal be adjudged based on the merits of the single independent claim, claim 1, and that all claims should stand or fall together based upon the decision concerning claim 1.

Arguments

There were five Office Actions in this case.

The first Office Action dated May 23, 2002 alleged a *prima facie* case of obviousness of all claims. Appellants overcame the allegations in their Response dated August 8, 2002.

The second Office Action dated November 5, 2002 included a new allegation of a *prima facie* case of obviousness respecting all claims based on WO 99/05084. Appellants again overcame the allegations in their response dated November 5, 2002.

The third Office Action dated 1/28/2003, contained a third new allegation of a *prima facie* case of obviousness respecting all claims except claims 11 and 13 based on US 5,193,618. Appellants overcame the allegations in their Response dated 4/23/03.

The fourth Office Action dated 7/11/03 again alleged new grounds for a *prima facie* case of obviousness of all claims under 35 USC § 103. Appellants again overcame the allegations in their Response dated September 9, 2003

The fifth Office Action dated 11/21/2003 included a fifth new allegation of a *prima facie* case of obviousness based on the Feierstein et al reference. Appellants filed a response dated February 23, 2004 arguing why the Feierstein et al reference is inapplicable, using substantially the same argument which was used to successfully refute the exact same rejection in the parent to this case. The Office maintained the rejection, and Applicants became Appellants.

We suggest that the Office has been excessive in this case with regards to raising new grounds for rejection under 35 USC § 103. We further note that the remaining outstanding rejection in the present case is the same rejection as was made in the issued parent (US 6,562,776) to this case, which rejection was previously overcome using substantially the same arguments which Appellants have set forth in their latest Response, and in this Brief.

There are no anticipation rejections of any claims in the present application under any section of 35 USC § 102. Thus, the subject matter defined by claims 1-101 is novel in view of the prior art of record.

Issue 1 - Whether claims 1 – 101 are patentable over Feierstein et al. (US 4,162,236)

The 5/13/04 Office Action indicates that claims 1-101 are rejected under 35 USC § 103 (a) based on the Feierstein et al. reference, stating that:

"Applicant Argues that the 2-phenyl content disclosed in Feierstein et al does not encompass the claimed invention.

The examiner contends that the content disclosed in Feierstein et al, the examiner does agree with the applicant that the "60%" describes the 2-phenyl content of the alkyl chains having 12 or more carbon atoms. Therefore, the general teachings in Feierstein et al teach that

the 2-phenyl content of the alkyl benzene is determined by the catalyst and reaction temperatures and it is necessary to separate the alkyl benzene having high 2-phenyl content from alkylbenzenes wherein the aromatic moiety is at other than 2-phenyl positions on the chain (col. 2, lines 47-53). Moreover, the catalyst have been described at column 2, lines 17-30 and applicant specifically noted Table 1 wherein the preferred embodiment is used. However, applicant has not shown any criticality with respect to the other catalyst disclosed. Accordingly, it would have been obvious to one skilled in the art, absent a showing to the contrary, to increase the 2-phenyl content of said alkylbenzene sulfonate by reacting the alkylated catalyst with the olefin to produce a higher 2-phenyl content as disclosed by Feierstein et al."

Appellants are grateful the Examiner's acknowledges that the Feierstein et al reference does not disclose an alkyl benzene sulfonate having a 2-phenyl content of 60%. However, the Examiner's statement that: "The examiner does agree with applicant that the "60%" describes the 2-phenyl content of the alkyl chains having 12 or more carbon atoms" **is an inaccurate interpretation** of our statements. We never said this, nor do we agree with it. Again, Appellants reiterate that the reference in Feierstein et al to "60 percent" refers to the percentage of alkyl chains having 12 or more carbon atoms as compared to the total 2-phenyl content, and not the total alkylbenzene sulfonate content. We especially request the Board to give careful consideration to exactly what is being said in Feierstein et al. Our previous arguments clearly set forth that what Feierstein et al does disclose is an alkyl benzene sulfonate component in which, of all of the various isomers present, those with alkyl chains having at least 12 carbon atoms account for 60% of the total 2-phenyl isomer content in the mixture, wherein the mixture comprises that one component. In our compositions, the claimed percentage range of 2-phenyl isomer content LAB sulfonate is made with respect to the total weight of the LAB sulfonate component. We know that prior to our invention of the fluoridated mordenite catalyst in our process patents issued in the late 1990's that there was no catalyst available which could be used commercially capable of producing LAB having high 2-phenyl content such as that in our current claims. We know this because our company had purchased the Monsanto LAB business from Monsanto in 1993

(Feierstein et al is a Monsanto patent.) The Feierstein reference claims conventional LAB, which is about 18 % in total 2-phenyl content based on the total weight of all LAB isomers present in the product. What Feierstein et al found was that by altering processing conditions in its conventional manufacturing plant, as described in column 2 of Feierstein, that the LAB having carbon chains greater than 12 carbons in length could be made to account for greater than 60% of the total 2-phenyl isomers content, even though the total 2-phenyl isomers content of the LAB produced was only about 18%.

Appellants respectfully note that MPEP 8th edition, § 706.02(j) sets forth on page 700-31 the three basic criteria which must be met for establishing a *prima facie* case of obviousness:

"First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art and not based upon applicant's disclosure."

Thus, a requirement for the establishment of a *prima facie case* of obviousness and hence a proper rejection under 35 USC § 103(a) is that there must be some suggestion or motivation present to modify the reference to meet Appellants instant claims.

Since none of the prior art of record anticipates the present invention, in view of the foregoing paragraph Appellants believe the pivotal question regarding patentability of the instant claims is whether there exists any teaching, suggestion, or motivation for one of ordinary skill in the art to modify the Feierstein et al reference to arrive at the Appellants' claimed subject matter.

The statement which alleges obviousness in the 5/13/04 Office Action reads:

".....However, applicant has not shown any criticality with respect to the other catalyst disclosed. Accordingly, it would have been obvious to one skilled in the art, absent a showing to the contrary, to increase the 2-phenyl content of said alkylbenzene sulfonate by reacting the alkylated catalyst with the olefin to produce a higher 2-phenyl content as disclosed by Feierstein et al."

Appellants attempts at patenting their invention were frustrated by such a statement as a grounds for establishing a *prima facie* case of obviousness, since we are unaware of any requirement for Applicants for patent in the United States to "show criticality". The Office Action implies that in the absence of "criticality", then inventions are "accordingly...obvious". We submit that such a policy is inequitable inasmuch it renders an Applicant unable to respond to the allegations owing to a lack of definition of criticality. What is the standard upon which "criticality" is based ?

We believe that the burden remains on the Office to establish the *prima facie* case. It appears that an alleged *prima facie* case of obviousness is predicated on the conclusion in the last Office Action that "...Accordingly, it would have been obvious..." . However, in order to be valid, such a conclusion must necessarily follow from facts preceding such a conclusion, but must not be based on Applicant's disclosure. The only mention of any facts in the last Office Action is the statement that:

"the general teachings in Feierstein et al teach that the 2-phenyl content of the alkyl benzene is determined by the catalyst and relation temperatures and it is necessary to separate the alkyl benzene having high 2-phenyl content from alkylbenzenes wherein the aromatic moiety is at other than 2-phenyl positions on the chain"

We fail to see how the general teachings of separation of isomers in Feierstein et al leads one of ordinary skill to arrive at our claimed compositions. In fact, we have seen three pieces of prior art in the parent case (09/559,841, now US Patent 6,562,776)) of the instant CIP which specifically taught against the use of elevated 2-phenyl isomer contents in LAB surfactants formulations, viz., US patents 3,342,888; 3,387,056; and 3,509,225 all of which teach that higher amounts of 2-phenyl isomer in a linear alkylbenzene sulfonate is undesirable (US 3,342,888, col. 2, lines 39-41; US 3,387,056, col. 2, lines 21-24; US 3,509,225, col. 1, lines 59-62 et seq.). Appellants, in the face of prior art which clearly leads one of ordinary skill away from Applicant's claimed compositions, went on to discover

that higher amounts of 2-phenyl isomer indeed provides benefits of increased detergency, increased performance in the presence of water hardness, and the ability to formulate without the need of builders owing to the fact that the salts of these materials are solids at room temperature, unlike salts of linear alkyl benzenes previously available. Applicants believe that since the prior art teaches away from their claimed inventions, that a *prima facie* case of obviousness does not exist respecting claims 1-101, and these claims should be allowable.

Owing to the last sentence of MPEP 609 (I) A 2, "Such information need not be resubmitted in the continuing application unless the applicant desires the information to be printed on the patent, no separate IDS was filed in this case and all cited in the parent is believed to have been considered by the Office in this case.

We believe that no *prima facie* case of obviousness exists in the instant matter, and Appellants respectfully submit that the instantly-pending claims are allowable over the prior art of record.

Appellants respectfully appeal to the Board from the decision of the Examiner to re-consider the claim rejections under 35 USC 103(a), and to remove such rejections in view of the remarks of Appellants. Thank you for your consideration.

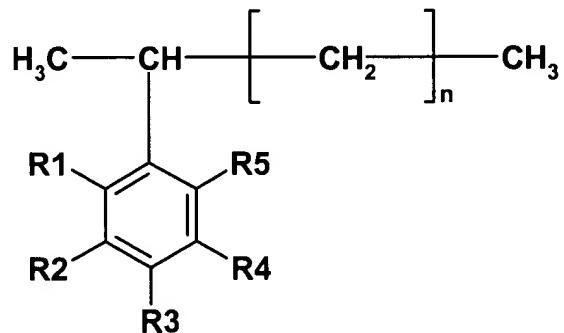
Respectfully Submitted,



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Appendix

1) A composition of matter comprising one or more sulfonated aromatic alkylates, which composition contains any amount between 30.00 % and 82.00 % by weight based upon the total weight of the mixture, including every hundredth percentage therebetween, of the 2-phenyl isomers of sulfonated aromatic alkylates described by the general formula:



in which n may be equal to any integer between 4 and 16, wherein one and only one of R₁, R₂, R₃, R₄ and R₅ is selected from the group of: a sulfonic acid group or a sulfonate group, and wherein one and only one of R₁, R₂, R₃, R₄ and R₅ is a substituent group that is selected from the group consisting of: methyl and ethyl.

2) A composition according to claim 1 wherein said comprising any amount between 40.00% and 70.00 %, including every hundredth percentage therebetween, by weight based upon the total weight of the mixture of the 2-phenyl isomers.

- 3) A composition according to claim 1 in which one and only one of R₁, R₂, R₃, R₄ and R₅ is a sulfonate group, and electrical neutrality is achieved by the presence of one or more cations selected from the group consisting of: sodium, potassium, lithium, rubidium, magnesium, calcium, strontium, ammonium, alkanolammonium, and alkyl-substituted ammonium.
- 4) A composition according to claim 3 wherein said mixture results from the neutralization of a sulfonated aromatic alkylate according to claim 1 in aqueous solution using an oxide, hydroxide, silicate, or carbonate of a metal selected from the group consisting of: sodium, potassium, lithium, rubidium, magnesium, calcium, and strontium.
- 5) A composition according to claim 1 wherein R₃ is methyl in at least 50 % of the sulfonic acids present in the mixture by weight based upon the total weight of the mixture.
- 6) A composition according to claim 1 wherein R₃ is ethyl in at least 50 % of the sulfonic acids present in the mixture by weight based upon the total weight of the mixture.
- 7) A composition according to claim 1 wherein R₃ is a sulfonic acid group in at least 25 % of the sulfonic acids present in the mixture by weight based upon the total weight of the mixture.
- 8) A composition according to claim 1 wherein the 2-phenyl isomers content of the sulfonated aromatic alkylate comprises any amount between 45.00% and 82.00% by weight based upon the total weight of the component, including every hundredth percentage therebetween.

9) A composition according to claim 1 wherein the 2-phenyl isomers content of the sulfonated aromatic alkylate comprises any amount between 57.00% and 82.00% by weight based upon the total weight of the component, including every hundredth percentage therebetween.

10) A composition according to claim 1 wherein the alkyl group bonded to the aromatic ring is substantially linear.

11) A composition according to claim 10 wherein the alkyl group comprises any integral number of carbon atoms between 7 and 16.

12) A composition according to claim 1 wherein the alkyl group bonded to the aromatic ring is a branched alkyl group.

13) A composition according to claim 12 wherein the alkyl group comprises any integral number of carbon atoms between 7 and 16.

14) A composition according to claim 1 further comprising an additional material known to be useful in formulating soaps, detergents, and the like, wherein at least one of said other components is selected from the group consisting of: fatty acids, alkyl sulfates, an ethanolamine, an amine oxide, alkali carbonates, water, ethanol, isopropanol, pine oil, sodium chloride, citric acid, citrates, nitriloacetic acid, sodium silicate, polymers, alcohol alkoxylates, zeolites, perborate salts, alkali sulfates, enzymes, hydrotropes, dyes, fragrances, preservatives, brighteners, builders, polyacrylates, essential oils, alkali hydroxides, water-soluble branched alkylbenzene sulfonates, ether sulfates, alkylphenol alkoxylates, fatty acid amides, alpha olefin sulfonates, paraffin sulfonates, betaines, chelating agents, tallowamine ethoxylates, polyetheramine ethoxylates, ethylene oxide/propylene oxide block copolymers, alcohol ethylene oxide/propylene oxide low foam surfactants, methyl ester sulfonates, alkyl polysaccharides, N-methyl glucamides, alkylated sulfonated diphenyl oxide, polyethylene glycol, and water soluble alkylbenzene sulfonates having a 2-phenyl isomer content of less than 30.00%.

15) A composition according to claim 14 wherein said additional material is a mixture of water soluble alkylbenzene sulfonates wherein said water soluble alkylbenzene sulfonates have a 2-phenyl isomer content of less than 25.00 % by weight based upon the total weight of said additional material.

16) A composition according to claim 14 wherein said sulfonated aromatic alkylates comprise any amount between 1.00% and 25.00% of the total composition on a weight basis.

17) A composition according to claim 14 wherein said additional material is present in any amount between 0.10% and 25.00% by weight based upon the total weight of said mixture.

- 18) A composition according to claim 14 further comprising a third component, wherein said third component is different from said second component and is selected from the group consisting of: at least one other component known to be useful in formulating soaps, detergents, and the like, wherein at least one of said other components is selected from the group consisting of: fatty acids, alkyl sulfates, an ethanolamine, an amine oxide, alkali carbonates, water, ethanol, isopropanol, pine oil, sodium chloride, sodium silicate, polymers, alcohol alkoxylates, zeolites, perborate salts, alkali sulfates, enzymes, hydrotropes, dyes, fragrances, preservatives, brighteners, builders, polyacrylates, essential oils, alkali hydroxides, water-soluble branched alkylbenzene sulfonates, and water soluble alkylbenzene sulfonates having a 2-phenyl isomer content of less than 30.00 %.
- 19) A composition according to claim 18 wherein said third component is a mixture of water soluble alkylbenzene sulfonates wherein said water soluble alkylbenzene sulfonates have a 2-phenyl isomer content of less than 25.00 % by weight based upon the total weight of said water soluble alkylbenzene sulfonate component.
- 20) The water-soluble salts of a composition according to claim 1 which are solids at room temperature and which include at least one anion selected from the group consisting of: sodium, potassium, calcium, and magnesium.
- 21) A salt of an alkyltoluene sulfonate, wherein said salt exists in the form of a solid at room temperature.

22) A composition of matter comprising a mixture of salts of alkyltoluene sulfonates wherein the salts of said alkyltoluene sulfonates comprise a single alkyl substituent selected from those having any carbon number in the detergent range bonded to a benzene ring to which benzene ring a sulfonate group is also bonded, wherein the 2-phenyl isomer content of such alkyltoluene sulfonate salt is sufficient to render such mixture of salts to exist in the form of a solid at room temperature.

23) A mixture of salts according to claim 22 having no melting point peak in the range of between 60 degrees centigrade and 90 degrees centigrade as measured by differential scanning calorimetry according to ASTM method D-3417.

24) A mixture of salts according to claim 22 wherein said salt comprises a cation selected from the group consisting of: alkali metal cations, alkaline earth metal cations, ammonium ions, and cationic surfactants.

25) A mixture of salts of an alkyltoluene sulfonate as in claim 24 wherein said cation is selected from the group consisting of: sodium and potassium.

26) A solid bar of soap comprising between 3.99% and 25.00 % by weight of 2-phenyl isomers of alkyltoluene sulfonate, wherein at least 50% of the alkyltoluene sulfonate isomers present are the 2-tolyl isomer.

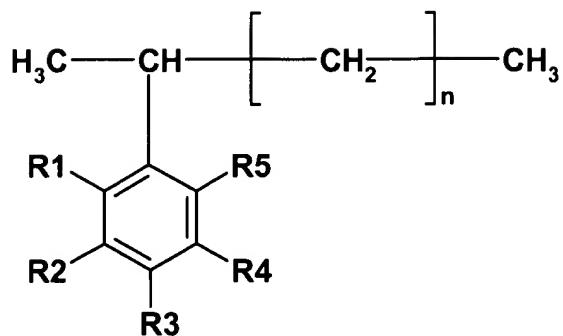
- 27) A free-flowing powdered detergent formulation which contains a solid salt of an alkyltoluene sulfonate and at least one other component known to be useful in formulating soaps, detergents, and the like.
- 28) A solid tablet useful for cleaning laundry which comprises a solid salt of an alkyltoluene sulfonate and at least one other component known to be useful in formulating soaps, detergents, and the like.
- 29) An emulsion formed from components comprising: a) an oil; b) water; and c) a composition according to claim 1.
- 30) An emulsion according to claim 29 wherein said emulsion is selected from the group consisting of: an oil-in-water emulsion and a water-in-oil emulsion.
- 31) An emulsion according to claim 29 wherein said emulsion comprises oil and water, wherein oil and water are present in equal amounts by weight or by volume.
- 32) An aqueous solution comprising a composition according to claim 1, wherein one and only one of R₁, R₂, R₃, R₄ and R₅ is a sulfonate group, and wherein the total amount of sulfonate in said aqueous solution is between 0.09% and 0.11 % by weight based upon the total weight of the solution, and wherein said components are present in effective amounts to provide a turbidity in said aqueous solution of below 200 NTU units when the total hardness level of the water is any value between 100-300 ppm.

33) An aqueous solution comprising a composition according to claim 1, wherein one and only one of R₁, R₂, R₃, R₄ and R₅ is a sulfonate group, and wherein the total amount of sulfonate in said aqueous solution is between 0.09% and 0.11 % by weight based upon the total weight of the solution, and wherein said components are present in effective amounts to provide a turbidity in said aqueous solution of below 100 NTU units when the total hardness level of the water is any value between 100-300 ppm.

34) An aqueous solution comprising a composition according to claim 1, wherein one and only one of R₁, R₂, R₃, R₄ and R₅ is a sulfonate group, and wherein the total amount of sulfonate in said aqueous solution is between 0.09% and 0.11 % by weight based upon the total weight of the solution, and wherein said components are present in effective amounts to provide a turbidity in said aqueous solution of below 50 NTU units when the total hardness level of the water is any value between 100-300 ppm.

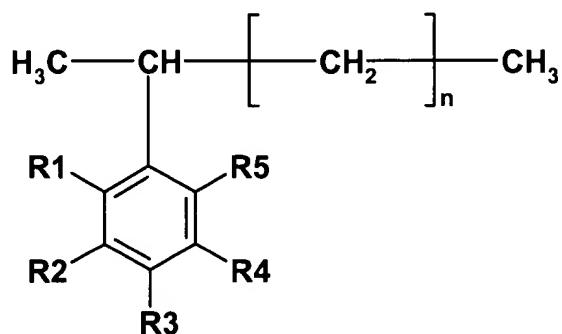
35) A composition that is useful in preparing finished detergent compositions useful for cleaning fabrics, dishes, hard surfaces, and other substrates that is formed from components comprising:

a) a first component present in any amount between 99.75% and 0.25% by weight based upon the total weight of the mixture, said first component characterized as comprising a mixture of two or more water-soluble sulfonates, which mixture contains any amount between 30.00 % and 82.00 % by weight based upon the total weight of the mixture, including every hundredth percentage therebetween, of the 2-phenyl isomers of sulfonated aromatic alkylates described by the general formula:



in which n may be equal to any integer between 4 and 16, wherein one and only one of R₁, R₂, R₃, R₄ and R₅ is selected from the group of: a sulfonic acid group or a sulfonate group, and wherein one and only one of R₁, R₂, R₃, R₄ and R₅ is a substituent group that is selected from the group consisting of: methyl and ethyl; and

b) a second component present in any amount between 0.25% and 99.75% by weight based upon the total weight of the mixture, said second component characterized as comprising any amount between 26.00 % and 82.00 % by weight, including every hundredth percentage therebetween, based upon the total weight of said second component of water-soluble sulfonates of the 2-phenyl isomers of alkylbenzenes described by the general formula:



wherein n is equal to any integer between 4 and 16, and wherein any one, but only one, of R₁, R₂, R₃, R₄ and R₅ is selected from the group consisting of: a sulfonic acid group or a sulfonate group, and wherein those of R₁, R₂, R₃, R₄ and R₅ which are not a sulfonic acid group or a sulfonate group are hydrogen.

36) A composition according to claim 35 wherein the 2-phenyl isomers content of the first component comprises any amount between 45.00% and 82.00% by weight based upon the total weight of the component, including every hundredth percentage therebetween.

37) A composition according to claim 35 wherein the 2-phenyl isomers content of the first component comprises any amount between 57.00% and 82.00% by weight based upon the total weight of the component, including every hundredth percentage therebetween.

38) A composition according to claim 35 wherein the 2-phenyl isomers content of the second component comprises any amount between 45.00% and 82.00% by weight based upon the total weight of the component, including every hundredth percentage therebetween.

39) A composition according to claim 35 wherein the 2-phenyl isomers content of the second component comprises any amount between 57.00% and 82.00% by weight based upon the total weight of the component, including every hundredth percentage therebetween.

- 40) A composition according to claim 35 in which both components are sulfonates, and wherein said sulfonates are salts comprising cations of an element selected from the group consisting of: sodium, potassium, lithium, rubidium, magnesium, calcium, and strontium.
- 41) A composition according to claim 35 wherein said mixture is solid at room temperature and has no melting point in the range of about 40 degrees centigrade and 80 degrees centigrade as measured by differential scanning calorimetry according to ASTM method D-3417.
- 42) A composition according to claim 40 wherein said mixture results from the neutralization of a mixture of the sulfonic acids corresponding to said sulfonates in aqueous solution using an oxide, hydroxide, or carbonate of a metal selected from the group consisting of: sodium, potassium, lithium, rubidium, magnesium, calcium, and strontium.
- 43) A composition according to claim 35 wherein R₃ is methyl in at least 25 % of the sulfonates present in said first component of the mixture, by weight based upon the total weight of the first component.
- 44) A composition according to claim 35 wherein R₃ is methyl in at least 25 % of the sulfonates present in said second component of the mixture by weight based upon the total weight of the second component.

- 45) A composition according to claim 35 wherein R₃ is selected from the group consisting of: a sulfonic acid group or a sulfonate group in at least 50 % of the sulfonates present in the first component by weight based upon the total weight of the first component.
- 46) A composition according to claim 35 wherein R₃ is selected from the group consisting of: a sulfonic acid group or a sulfonate group in at least 50 % of the sulfonates present in the second component by weight based upon the total weight of the second component.
- 47) An aqueous solution comprising a composition according to claim 35, wherein the combined amount of said first and said second components is between 0.09% and 0.11 % by weight based upon the total weight of the solution, and wherein said components are present in effective amounts to provide a turbidity in said aqueous solution of below 200 NTU units when the total hardness level of the water is any value between 100-300 ppm.
- 48) An aqueous solution comprising a composition according to claim 35, wherein the combined amount of said first and said second components is between 0.09% and 0.11 % by weight based upon the total weight of the solution, and wherein said components are present in effective amounts to provide a turbidity in said aqueous solution of below 150 NTU units when the total hardness level of the water is any value between 100-300 ppm.

49) An aqueous solution comprising a composition according to claim 35, wherein the combined amount of said first and said second components is between 0.09% and 0.11 % by weight based upon the total weight of the solution, and wherein said components are present in effective amounts to provide a turbidity in said aqueous solution of below 50 NTU units when the total hardness level of the water is any value between 100-300 ppm.

50) A composition of matter useful for cleaning comprising a composition according to claim 35 and at least one other component known to be useful in formulating soaps, detergents, and the like, wherein the improvement comprises providing in said first and said second components of said mixture an effective 2-phenyl isomer content sufficient to cause an aqueous solution formed from mixing said composition with tap water to have a turbidity of less than 200 NTU units when the total hardness level of the water is any value between 100-300 ppm, and in which the total sulfonate surfactant concentration in said composition is any amount between 0.09 and 0.11 %.

51) A composition of matter useful for cleaning comprising a composition according to claim 35 and at least one other component known to be useful in formulating soaps, detergents, and the like, wherein the improvement comprises providing in said first and said second components of said mixture an effective 2-phenyl isomer content sufficient to cause an aqueous solution formed from mixing said composition with tap water to have a turbidity of less than 150 NTU units when the total hardness level of the water is any value between 100-300 ppm, and in which the total sulfonate surfactant concentration in said composition is any amount between 0.09 and 0.11 %.

52) A composition of matter useful for cleaning comprising a composition according to claim 35 and at least one other component known to be useful in formulating soaps, detergents, and the like, wherein the improvement comprises providing in said first and said second components of said mixture an effective 2-phenyl isomer content sufficient to cause an aqueous solution formed from mixing said composition with tap water to have a turbidity of less than 50 NTU units when the total hardness level of the water is any value between 100-300 ppm, and in which the total sulfonate surfactant concentration in said composition is any amount between 0.09 and 0.11 %.

53) A composition according to claim 35 wherein the alkyl group on said first component is a linear alkyl group.

54) A composition according to claim 35 wherein the alkyl group on said first component is a branched alkyl group.

55) A composition according to claim 35 wherein the alkyl group on said second component is a linear alkyl group.

56) A composition according to claim 35 wherein the alkyl group on said second component is a branched alkyl group.

57) A composition according to claim 35 further comprising an additional material known to be useful in formulating soaps, detergents, and the like, wherein at least one of said other components is selected from the group consisting of: fatty acids, alkyl sulfates, an ethanolamine, an amine oxide, alkali carbonates, water, ethanol, isopropanol, pine oil, sodium chloride, sodium silicate, polymers, alcohol alkoxylates, zeolites, perborate salts, alkali sulfates, enzymes, hydrotropes, dyes, fragrances, preservatives, brighteners, builders, polyacrylates, essential oils, alkali hydroxides, water-soluble branched alkylbenzene sulfonates, ether sulfates, alkylphenol alkoxylates, fatty acid amides, alpha olefin sulfonates, paraffin sulfonates, betaines, chelating agents, tallowamine ethoxylates, polyetheramine ethoxylates, ethylene oxide/propylene oxide block copolymers, alcohol ethylene oxide/propylene oxide low foam surfactants, methyl ester sulfonates, alkyl polysaccharides, N-methyl glucamides, alkylated sulfonated diphenyl oxide, polyethylene glycol, water soluble alkyltoluene sulfonates having a 2-phenyl isomer content of less than 30.00 %, and water soluble alkylbenzene sulfonates having a 2-phenyl isomer content of less than 26.00 %

58) A composition according to claim 57 wherein the total concentration of water soluble sulfonates is between 0.025% and 25.00% by weight, based upon the total weight of the solution, and including every hundredth percentage therebetween.

59) A composition according to claim 57 wherein the total concentration of said additional material is between 0.10% and 25.00% by weight, based upon the total weight of the solution, and including every hundredth percentage therebetween.

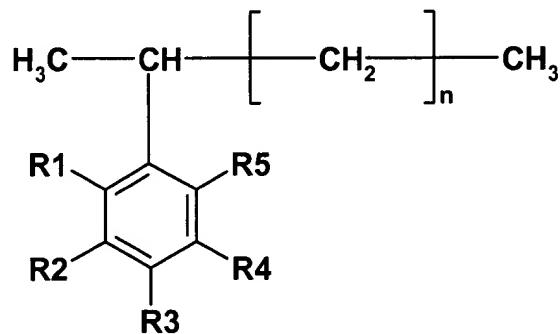
60) A composition according to claim 57 further comprising a third component, wherein said third component is different from said second component and is selected from the group consisting of: at least one other component known to be useful in formulating soaps, detergents, and the like, wherein at least one of said other components is selected from the group consisting of: fatty acids, alkyl sulfates, an ethanolamine, an amine oxide, alkali carbonates, water, ethanol, isopropanol, pine oil, sodium chloride, sodium silicate, polymers, alcohol alkoxylates, zeolites, perborate salts, alkali sulfates, enzymes, hydrotropes, dyes, fragrances, preservatives, brighteners, builders, polyacrylates, essential oils, alkali hydroxides, water-soluble branched alkylbenzene sulfonates, water soluble alkyltoluene sulfonates having a 2-phenyl isomer content of less than 30.00 %, and water soluble alkylbenzene sulfonates having a 2-phenyl isomer content of less than 26.00 %.

61) A solid bar of soap comprising between 2.00% and 25.00 % by weight based upon the total weight of the bar of soap of a composition according to claim 35.

62) A free-flowing powdered detergent formulation which contains a composition according to claim 35 and at least one other component known to be useful in formulating soaps, detergents, and the like.

63) A solid tablet useful for cleaning laundry which comprises a composition according to claim 35 and at least one other component known to be useful in formulating soaps, detergents, and the like.

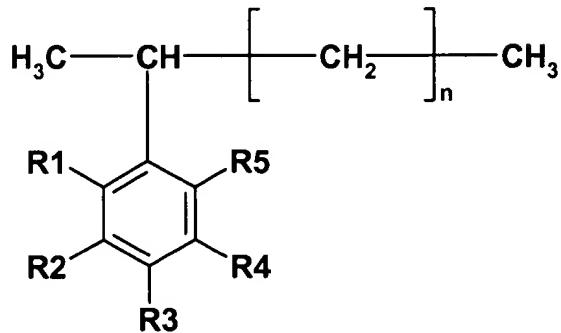
- 64) A composition that is useful in preparing finished detergent compositions useful for cleaning fabrics, dishes, hard surfaces, and other substrates that is formed from components comprising:
- a) a first component present in any amount between 99.75% and 0.25% by weight based upon the total weight of the mixture, said first component characterized as comprising a mixture of two or more water-soluble sulfonates, which mixture contains any amount between 30.00 % and 82.00 % by weight based upon the total weight of the mixture, including every hundredth percentage therebetween, of the 2-phenyl isomers of sulfonated aromatic alkylates described by the general formula:



in which n may be equal to any integer between 4 and 16, wherein one and only one of R_1 , R_2 , R_3 , R_4 and R_5 is selected from the group consisting of: a sulfonic acid group or a sulfonate group, and wherein one and only one of R_1 , R_2 , R_3 , R_4 and R_5 is a substituent group that is selected from the group consisting of: methyl and ethyl; and

- b) a second component present in any amount between 0.25% and 99.75% by weight based upon the total weight of the mixture, said second component characterized as comprising any amount between 50.00 % and 1.00 % by weight, including every hundredth percentage therebetween, based upon the

total weight of said second component of water-soluble sulfonates of the 2-phenyl isomers of alkylbenzenes described by the general formula:



wherein n is equal to any integer between 4 and 16, and wherein any one, but only one, of R_1 , R_2 , R_3 , R_4 and R_5 is selected from the group consisting of: a sulfonic acid group or a sulfonate group, and wherein those of R_1 , R_2 , R_3 , R_4 and R_5 which is not a sulfonic acid group or a sulfonate group are hydrogen.

65) A composition according to claim 64 wherein the 2-phenyl isomers content of the first component comprises any amount between 45.00% and 82.00% by weight based upon the total weight of the component, including every hundredth percentage therebetween.

66) A composition according to claim 64 wherein the 2-phenyl isomers content of the first component comprises any amount between 57.00% and 82.00% by weight based upon the total weight of the component, including every hundredth percentage therebetween.

- 67) A composition according to claim 64 wherein the 2-phenyl isomers content of the second component comprises any amount between 45.00% and 82.00% by weight based upon the total weight of the component, including every hundredth percentage therebetween.
- 68) A composition according to claim 64 wherein the 2-phenyl isomers content of the second component comprises any amount between 57.00% and 82.00% by weight based upon the total weight of the component, including every hundredth percentage therebetween.
- 69) A composition according to claim 64 in which both components are sulfonates, and wherein said sulfonates are salts comprising cations of an element selected from the group consisting of: sodium, potassium, lithium, rubidium, magnesium, calcium, and strontium.
- 70) A composition according to claim 64 wherein said mixture is solid at room temperature and has a melting point in the range of about 40 degrees centigrade and 80 degrees centigrade as measured by differential scanning calorimetry according to ASTM method D-3417.
- 71) A composition according to claim 69 wherein said mixture results from the neutralization of a mixture of the sulfonic acids corresponding to said sulfonates in aqueous solution using an oxide, hydroxide, or carbonate of a metal selected from the group consisting of: sodium, potassium, lithium, rubidium, magnesium, calcium, and strontium.

72) A composition according to claim 64 wherein R₃ is methyl in at least 25 % of the sulfonates present in said first component of the mixture, by weight based upon the total weight of the first component.

73) A composition according to claim 64 wherein R₃ is methyl in at least 25 % of the sulfonates present in said second component of the mixture by weight based upon the total weight of the second component.

74) A composition according to claim 64 wherein R₃ is selected from the group consisting of: a sulfonic acid group or a sulfonate group in at least 50 % of the sulfonates present in the first component by weight based upon the total weight of the first component.

75) A composition according to claim 64 wherein R₃ is selected from the group consisting of: a sulfonic acid group or a sulfonate group in at least 50 % of the sulfonates present in the second component by weight based upon the total weight of the second component.

76) An aqueous solution comprising a composition according to claim 64, wherein the combined amount of said first and said second components is between 0.09% and 0.11 % by weight based upon the total weight of the solution, and wherein said components are present in effective amounts to provide a turbidity in said aqueous solution of below 200 NTU units when the total hardness level of the water is any value between 100-300 ppm.

77) An aqueous solution comprising a composition according to claim 64, wherein the combined amount of said first and said second components is between 0.09% and 0.11 % by weight based upon the total weight of the solution, and wherein said components are present in effective amounts to provide a turbidity in said aqueous solution of below 150 NTU units when the total hardness level of the water is any value between 100-300 ppm.

78) An aqueous solution comprising a composition according to claim 64, wherein the combined amount of said first and said second components is between 0.09% and 0.11 % by weight based upon the total weight of the solution, and wherein said components are present in effective amounts to provide a turbidity in said aqueous solution of below 50 NTU units when the total hardness level of the water is any value between 100-300 ppm.

79) A composition of matter useful for cleaning comprising a composition according to claim 64 and at least one other component known to be useful in formulating soaps, detergents, and the like, wherein the improvement comprises providing in said first and said second components of said mixture an effective 2-phenyl isomer content sufficient to cause an aqueous solution formed from mixing said composition with tap water to have a turbidity of less than 200 NTU units when the total hardness level of the water is any value between 100-300 ppm, and in which the total sulfonate surfactant concentration in said composition is any amount between 0.09 and 0.11 %.

80) A composition of matter useful for cleaning comprising a composition according to claim 64 and at least one other component known to be useful in formulating soaps, detergents, and the like, wherein the improvement comprises providing in said first and said second components of said mixture an effective 2-phenyl isomer content sufficient to cause an aqueous solution formed from mixing said composition with tap water to have a turbidity of less than 150 NTU units when the total hardness level of the water is any value between 100-300 ppm, and in which the total sulfonate surfactant concentration in said composition is any amount between 0.09 and 0.11 %.

81) A composition of matter useful for cleaning comprising a composition according to claim 64 and at least one other component known to be useful in formulating soaps, detergents, and the like, wherein the improvement comprises providing in said first and said second components of said mixture an effective 2-phenyl isomer content sufficient to cause an aqueous solution formed from mixing said composition with tap water to have a turbidity of less than 50 NTU units when the total hardness level of the water is any value between 100-300 ppm, and in which the total sulfonate surfactant concentration in said composition is any amount between 0.09 and 0.11 %.

82) A composition according to claim 64 wherein the alkyl group on said first component is a linear alkyl group.

83) A composition according to claim 64 wherein the alkyl group on said first component is a branched alkyl group.

- 84) A composition according to claim 64 wherein the alkyl group on said second component is a linear alkyl group.
- 85) A composition according to claim 64 wherein the alkyl group on said second component is a branched alkyl group.
- 86) A composition according to claim 64 wherein said first component comprises any amount between 10.00% and 55.00%, by weight, including every hundredth percentage therebetween, of the total combined weights of both of said first component and said second components present in said mixture.
- 87) A composition according to claim 64 wherein said first component comprises any amount between 15.00% and 48.00%, by weight, including every hundredth percentage therebetween, of the total combined weights of both of said first component and said second components present in said mixture.
- 88) A composition according to claim 64 wherein said first component comprises any amount between 25.00% and 35.00%, by weight, including every hundredth percentage therebetween, of the total combined weights of both of said first component and said second components present in said mixture.

89) A composition according to claim 64 further comprising an additional material known to be useful in formulating soaps, detergents, and the like, wherein at least one of said other components is selected from the group consisting of: fatty acids, alkyl sulfates, an ethanolamine, an amine oxide, alkali carbonates, water, ethanol, isopropanol, pine oil, sodium chloride, sodium silicate, polymers, alcohol alkoxylates, zeolites, perborate salts, alkali sulfates, enzymes, hydrotropes, dyes, fragrances, preservatives, brighteners, builders, polyacrylates, essential oils, alkali hydroxides, water-soluble branched alkylbenzene sulfonates, ether sulfates, alkylphenol alkoxylates, fatty acid amides, alpha olefin sulfonates, paraffin sulfonates, betaines, chelating agents, tallowamine ethoxylates, polyetheramine ethoxylates, ethylene oxide/propylene oxide block copolymers, alcohol ethylene oxide/propylene oxide low foam surfactants, methyl ester sulfonates, alkyl polysaccharides, N-methyl glucamides, alkylated sulfonated diphenyl oxide, polyethylene glycol, water soluble alkylbenzene sulfonates having a 2-phenyl isomer content of greater than 30.00 %, and water soluble alkyltoluene sulfonates having a 2-phenyl isomer content of less than 50.00 %

90) A composition according to claim 89 wherein the total concentration of water soluble sulfonates is between 0.025% and 25.00% by weight, based upon the total weight of the solution, and including every hundredth percentage therebetween.

91) A composition according to claim 89 wherein the total concentration of said additional material is between 0.10% and 25.00% by weight, based upon the total weight of the solution, and including every hundredth percentage therebetween.

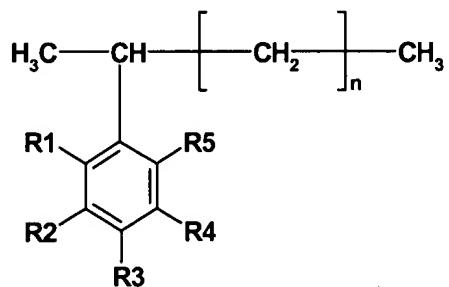
92) A composition according to claim 89 further comprising a third component, wherein said third component is different from said second component and is selected from the group consisting of: at least one other component known to be useful in formulating soaps, detergents, and the like, wherein at least one of said other components is selected from the group consisting of: fatty acids, alkyl sulfates, an ethanolamine, an amine oxide, alkali carbonates, water, ethanol, isopropanol, pine oil, sodium chloride, sodium silicate, polymers, alcohol alkoxylates, zeolites, perborate salts, alkali sulfates, enzymes, hydrotropes, dyes, fragrances, preservatives, brighteners, builders, polyacrylates, essential oils, alkali hydroxides, water-soluble branched alkylbenzene sulfonates, water soluble alkyltoluene sulfonates having a 2-phenyl isomer content of less than 30.00 %, and water soluble alkylbenzene sulfonates having a 2-phenyl isomer content of less than 26.00 %.

93) A solid bar of soap comprising between 2.00% and 25.00 % by weight based upon the total weight of the bar of soap of a composition according to claim 64.

94) A free-flowing powdered detergent formulation which contains a composition according to claim 64 and at least one other component known to be useful in formulating soaps, detergents, and the like.

95) A solid tablet useful for cleaning laundry which comprises a composition according to claim 64 and at least one other component known to be useful in formulating soaps, detergents, and the like.

96) A composition useful for cleaning various surfaces, and other substrates that is formed from components comprising: a) an alkyltoluene sulfonate surfactant component present in any amount between 0.25 % and 99.50 % by weight based upon the total weight of the finished detergent composition, said component characterized as comprising any amount between 26.00 % and 82.00 % by weight based upon the total weight of the component, and including every hundredth percentage therebetween, of water-soluble sulfonates of the 2-phenyl isomers of alkyltoluenes described by the general formula:



wherein n is equal to any integer between 4 and 16, wherein one and only one of R₁, R₂, R₃, R₄ and R₅ is a sulfonate group, and wherein one and only one of R₁, R₂, R₃, R₄ and R₅ is a substituent group selected from the group consisting of methyl and ethyl; and

b) any amount between 0.50 % and 99.75 % of at least one other components known to be useful in formulating soaps, detergents, and the like, wherein at least one of said other components is selected from the group consisting of: fatty acids, alkyl sulfates, an ethanolamine, an amine oxide, alkali carbonates, water, ethanol, isopropanol, pine oil, sodium chloride, sodium silicate, polymers, alcohol alkoxylates, zeolites, perborate salts, alkali sulfates, enzymes, hydrotropes, dyes, fragrances, preservatives, brighteners, builders, polyacrylates, essential oils, alkali hydroxides, ether sulfates, alkylphenol ethoxylates, fatty acid amides, alpha olefin sulfonates, paraffin sulfonates, betaines, chelating agents, tallowamine ethoxylates, polyetheramine ethoxylates, ethylene oxide/propylene oxide

block copolymers, alcohol ethylene oxide/propylene oxide low foam surfactants, methyl ester sulfonates, alkyl polysaccharides, N-methyl glucamides, alkylated sulfonated diphenyl oxide, water-soluble alkylbenzene sulfonates having a 2-phenyl isomer content of less than 26.00 %, water-soluble alkylbenzene sulfonates having a 2-phenyl isomer content of greater than 26.00 %, or alkyltoluene sulfonates having a 2-phenyl isomer content of less than 26.00 %.

97) A composition of matter useful for cleaning, comprising: an alkyltoluene sulfonate anions component and at least one other component known to be useful in formulating soaps, detergents, and the like, wherein the improvement comprises providing an increased 2-phenyl isomer content in the alkyltoluene sulfonate anions component sufficient to cause an aqueous solution formed from mixing said composition with tap water to have a turbidity of less than 200 NTU units when the total hardness level of the water is any value between 100-300 ppm and in which the surfactant concentration in the cleaning solution is any amount between 0.09 and 0.11 %.

98) A composition of matter useful for cleaning, comprising: an alkyltoluene sulfonate anions component and at least one other component known to be useful in formulating soaps, detergents, and the like, wherein the improvement comprises providing an increased 2-phenyl isomer content in the alkyltoluene sulfonate anions component sufficient to cause an aqueous solution formed from mixing said composition with tap water to have a turbidity of less than 100 NTU units when the total hardness level of the water is any value between 100-300 ppm and in which the surfactant concentration in the cleaning solution is any amount between 0.09 and 0.11 %.

99) A composition of matter useful for cleaning, comprising: an alkyltoluene sulfonate anions component and at least one other component known to be useful in formulating soaps, detergents, and the like, wherein the improvement comprises providing an increased 2-phenyl isomer content in the alkyltoluene sulfonate anions component sufficient to cause an aqueous solution formed from mixing said composition with tap water to have a turbidity of less than 50 NTU units when the total hardness level of the water is any value between 100-300 ppm and in which the surfactant concentration in the cleaning solution is any amount between 0.09 and 0.11 %.

100) A composition according to claim 96 wherein said surface is selected from the group consisting of: fabrics, dishes, aluminum vehicles, dairy equipment and aircraft.

101) A composition useful for cleaning, wherein said composition includes at least 0.50 % by weight, based upon the total weight of the composition, of a composition according to any of claims 1, 58, 64, or 94.